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ABSTRACT

Developed to aid intermediate-level teachers and principals in initiating and developing computer literacy programs for their students, this document is a guide for the development of a one-semester course--Introduction to Computing--for the seventh and eighth grades. The course is designed to provide opportunities for students to develop computer literacy skills and understanding through classroom instruction in combination with hands-on computer experiences. The guide includes a sample course schedule of topics to be covered each week during the semester, a course description, course management considerations, sample activities, and suggested resources. The sample activities, which reflect the four instructional modes of the computer as tool, tutor, tutee, and topic, include Getting Started, Word Processing, Database Privacy, Computer Crime and Ethics, Databases, Electronic Spreadsheets, and Graphics Programming. The course description includes course objectives, student prerequisites, and materials needed. Suggested resources include both textbooks and software. The Taxonomy of Goals, Objectives and Student Expectations for Exploratory Computer Literacy, Grades K-12 is appended. (DJR)

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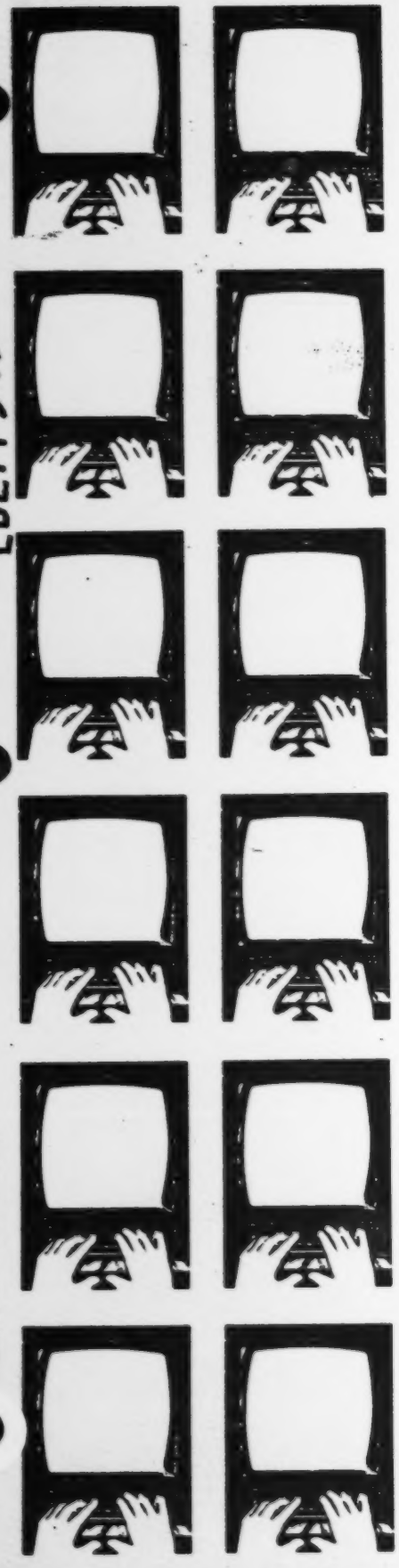

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INTRODUCTION TO COMPUTING COURSE GUIDE

OFFICE OF INSTRUCTIONAL SERVICES/GENERAL EDUCATION BRANCH
DEPARTMENT OF EDUCATION ◻ STATE OF HAWAII ◻ RS 86-9371 ◻ MARCH 1986

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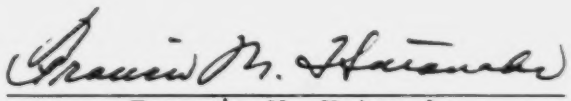
FOREWORD

The exploratory computer literacy program aims to develop computer-literate students capable of functioning in a society that has become increasingly dependent upon technology. Responsible and ethical uses of this technology, as well as the many and varied applications of technology in our information society are a major focus of the computer literacy program.

This document is a course guide for the development of a one-semester course, Introduction to Computing, targetted for students in grades 7 and 8. It provides teachers with guidelines, suggested activities, and a resource list to use in structuring the course.

We hope that intermediate-level teachers and principals will find this guide useful for initiating and developing opportunities for providing computer experiences for their students.



Francis M. Hatanaka
Superintendent

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The Introduction to Computing Course Guide was developed for the Hawaii State Department of Education by Jan M. Matsuura, District Resource Teacher for Computer Education, Central District Office. The Department of Education acknowledges her initiative and expertise in coordinating the many elements necessary in completing this guide.

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INTRODUCTION

Exploratory computer literacy is a sub-component of the Department's Computers in Instruction program. It is K-12 in scope, thematic in nature and the delivery in the classroom is designed for interfacing with all regular subject areas. The Exploratory Computer Literacy Curriculum Guide, Grades 7-8, includes a scope and sequence and activities modules for the instructional areas of mathematics, science, social studies and language arts.

To assist secondary schools in developing an exploratory computer literacy program, guidelines and models for school planning are provided in Appendix A of Computers in Instruction: Framework for Administrators. One of the five alternative models is an elective, one-semester course.

This course guide is developed with the intent of providing suggested units and activities, upon which the teacher can organize, build and expand his or her course in Introduction to Computing. The guide includes a course description, course management considerations, sample activities and suggested resources. The sample activities cover computer applications, such as word processing, data bases, electronic spreadsheets and graphics programming, and topics related to privacy, computer crime and ethics.

There is an abundance of resource materials and software for an introductory course in computer literacy at the secondary level. In addition, textbooks with teacher guides and supporting diskettes have become available. Teachers who incorporate computers into their curriculum will be able to provide new instructional alternatives for their students.

The guidelines and suggested activities reflect an environment in which a computer lab is available for hands-on experiences. The activities provided will have to be modified, depending on differences in the availability of microcomputers, where they are located in the school, class size, teaching styles and student background. As new computer applications are developed, the emphasis and focus of the course will need to be adjusted to accommodate these new tools.

The sample activities provided in this guide utilize all four instructional modes described in the Exploratory Computer Literacy Curriculum Guide, Grades 7-8:

1. The computer as a tutor includes methods of instruction which use the computer to guide a student through a lesson.

2. The computer as a tutee includes methods of instruction using computer programming techniques by students who instruct the computer to perform a specific task.

3. The computer as a tool includes methods of using the computer to provide a service or aid to the student.

4. The computer as a topic deals with instruction in the mechanics of computers, how computers function and their impact on the areas of science, technology and education as well as daily life.

COURSE DESCRIPTION

Background

This course addresses the Taxonomy of Goals, Objectives and Student Expectations for Exploratory Computer Literacy, Grades K-12. (See Appendix A.)

The Course Coverage Chart on pages -- to -- condenses the taxonomy into short essential phrases. The numeric system of the taxonomy is listed on the left of the Course Coverage Chart. The Benchmark Grade Level column represents the grade at which each student expectation is recommended to be met. The contributions of each unit in this guide in meeting the goals, objectives and student expectations for exploratory computer literacy are also displayed on the Course Coverage Chart.

Introduction

This course is designed to provide opportunities for intermediate school students to develop computer literacy skills and understanding through classroom instruction in combination with hands-on computer experiences. The focus of the course is on using the computer in learning through word processing and other application packages, information retrieval using data bases and CAI programs where appropriate. Programming concepts and skills are taught in a problem-solving context. Discussion of the impact, values and ethics of computer applications should be integrated into the course as situations arise in the classroom or are reported in the news media.

Objectives

1. Describe operations and functions of computers.
    a. Identify and explain terms relating to computer hardware.
    b. List and describe different methods/devices for input, output and data storage.
    c. Describe functions of the central processing unit.
    d. Identify and explain terms relating to computer application and system software.
2. Demonstrate ability to use the computer in learning.
    a. Interact with pre-packaged computer programs.
    b. Identify features of each application software introduced; e.g., word processors, computerized data

bases, electronic spreadsheets, graphics and communication tools.

c. Identify uses of the application software in the student's environment.

d. Develop skills for using the application software as a tool in problem solving and decision making.

3. Develop understanding of the impact, values and ethics of computer applications.

a. Describe historical evolution of calculating tools and the problems that motivated their development.

b. Identify computer applications in business, schools, science, government and social sciences.

c. Discuss impact of technology on the workplace.

d. Discuss issues related to computer use and misuse.

4. Develop elementary programming concepts and skills.

a. Recognize that a computer language is needed to communicate with a computer.

b. Develop strategies and procedures for developing computer programs to solve problems.

c. Develop concepts of structured programming.

Recommended Background

Students taking this course should have met the student performance expectations identified for benchmark grades 3 and 6 on the Course Coverage Chart on pages -- to --.

Materials

1. Microcomputers with at most two students per computer per class, preferably all the same make and model.

2. A copy of each application software for each microcomputer in the lab to adhere to copyright laws. This may be costly, but many companies now offer multiple copy discounts for school use.

3. Several blank diskettes, about two per student.

4. Individual student handouts for each unit.

5. Overhead projector and screen.

6. (Optional) A textbook on computer literacy. (See reference section.)

TOPIC OUTLINE

I. GETTING STARTED

- A. Review of Components and Functions
- B. Hardware
- C. Keyboard Tutorial
- D. Diskette Care and Handling
- E. Review of History of Computers

II. WORD PROCESSING

- A. Creating a Document
- B. Loading
- C. Editing
- D. Printing
- E. Saving

III. DATABASE PRIVACY

- A. Definition of Privacy
- B. Databases in our Community
- C. Letters and Interviews
- D. Oral and Written Reports

IV. COMPUTER CRIME AND ETHICS

- A. Discussing Issues
- B. Making Choices
- C. Clarifying Positions

V. DATABASE

- A. Creating a Design
- B. Searching/Updating Records
- C. Analyzing Data
- D. Formulating Questions

VI. ELECTRONIC SPREADSHEET

- A. Use - What If?
- B. Creating a Design
- C. Functions and Formulas

VII. GRAPHICS

- A. Low-Resolution Graphics
- B. Printing
- C. Saving

COURSE COVERAGE

1. CONFIDENCE ABOUT COMPUTER USE	Benmark Grade Level	Word Processing	Data Base	Privacy	Ethics	Spreadsheet	Graphics	
1.1. Interacts with Computer		x	x			x	x	
1.1.1. recognizes computer instructions	3	x	x			x	x	
1.1.2. reads instructions, keyboard, output	3	x	x			x	x	
1.1.3. uses control keys/commands	3	x	x			x	x	
1.1.4. selects/uses written resources	6							
1.1.5. experiments as a user	6	x	x			x	x	
1.1.6. responds to error messages	6	x	x			x	x	
1.2. Identifies Computer Rules		x	x			x		
1.2.1. rationalizes information processing	6		x			x		
1.2.2. determines structural components	6						x	
1.2.3. sequences process steps	6	x	x			x	x	
1.2.4. recognizes computer processes	12	x	x			x	x	
1.3 Explains Algorithm/Flowchart								
1.3.1. interprets	8							
1.3.2. generalizes uses	8							
1.3.3. discusses applications	8							
1.4. Identifies Methods of Communication w/Computer							x	
1.4.1. recognizes programming languages	8						x	
1.4.2. operates with words/symbols	8	x	x			x	x	
1.5. Develops Positive Attitudes/Behaviors		x	x			x	x	
1.5.1. seeks work/play with computer	6	x	x			x	x	
1.5.2. uses positive affect words	6	x	x			x	x	

	Benmark Grade Level	Word Processing	Data Base	Privacy	Ethics	Spreadsheet	Graphics
2. PROBLEM SOLVING/DECISION MAKING							
2.1. Uses Computerized Information Systems							
2.1.1. uses computer in decision making	12		x			x	
2.1.2. creates program from flowchart	8						
2.1.3. develops algorithm for problem solving	12						
2.1.4. describes problem solving/decision making process	12		x	x		x	
3. FUNCTIONS/IMPACT							
3.1. Identifies/Describes Computer Operations		x	x			x	
3.1.1. identifies input/output peripherals	3	x	x			x	
3.1.2. describes functions of input, output and processing	6	x	x			x	
3.2. Recognizes Computer Applications		x	x			x	
3.2.1. identifies applications	6	x	x			x	
3.3 Recognizes Impact on Daily Life		x		x			
3.3.1. values efficient information processing	12	x	x	x		x	
3.3.2. understands pros/cons of routine tasks	12	x	x	x			
3.3.3. appreciates economic benefits	12			x			
3.3.4. values communication/information	12			x	x		
3.3.5. understands effects on economics, politics, crime	12			x	x		
3.3.6. identifies applications of computer science	12	x	x	x		x	
3.4. Differentiates Science/Technology							
3.4.1. knows evolution of electronic technology	6						
4. LIMITATIONS/USEFULNESS							
4.1. Recognizes Disadvantages		x	x			x	

	Benmark Grade Level	Word Processing	Data Base	Privacy	Ethics	Spreadsheet	Graphics
4.1.1. lists limitations	8	x	x			x	
4.2. Identifies Major Applications		x	x	x		x	
4.2.1. describes how computers assist people	8	x	x	x		x	
5. EDUCATION/CAREER OPPORTUNITIES 5.1. Recognizes Support/Technical/Scientific Careers	3			x			
5.1.1. identifies local services/personnel	6						
5.2 Recognizes Opportunities for Integrating Computers in Other Careers							
5.2.1. compares educational requirements/opportunities	8						

CLASSROOM MANAGEMENT

Ideal facilities are a computer lab and an adjoining classroom. The secured lab should have the sufficient number of microcomputers and an overhead projector and screen. Posters dealing with care and handling of both hardware and diskettes along with the reference charts for the various software programs can be displayed on bulletin boards. The classroom should have individual student desks for flexibility in accommodating groups (some lessons require a large group setting, while other lessons require dividing the class into smaller groups). Posters dealing with the use of computers in society or other relevant computer topics can be displayed in the classroom.

Other arrangements include a large room set up with a classroom area and a lab area. This avoids the problem of having students on the computer while the teacher is carrying on a class discussion or giving directions.

Students should begin each period in the classroom for discussion and directions. The lab should be used for specific hands-on activities.

To ease diskette management, an area in the lab should be set aside for distribution and retrieval of diskettes. Each computer should be labeled with a letter or number. The diskettes used should have the corresponding labels. A system should be devised for students to go to a designated area in the lab to pick up their student data diskettes as well as the application software diskette being used that period. At the end of the period, students should return their diskettes to the designated place. The teacher should be able to see at a glance if all the diskettes have been returned. For example, reusable diskette boxes could be hung on the inside of a closet door. The box and diskettes could be labeled according to the corresponding label on the computer.

Because certain units may overlap, a semester calendar should be made before the semester begins in order to plan the onset and completion dates of each unit. A large calendar can be posted in the classroom as a reminder to students.

SAMPLE ACTIVITIES

OVERVIEW

The units selected for this course guide support the exploratory computer literacy goals, objectives and student expectations. For each unit, those course objectives for Introduction to Computing addressed by the sample activities are identified. The sample activities developed for each unit are intended to be "starting points" from which teachers can expand into their own approaches for their teaching/computing environment.

Each unit includes:

- -a brief description of the unit,
- -course objectives addressed,
- -materials needed,
- -a suggested teaching sequence, and
- -sample handouts.

Time periods for activities will vary according to school bell schedules, number and location of available microcomputers, and student background and experience with computers. A sample semester calendar is provided as a guideline for planning and scheduling units.

SAMPLE COURSE SCHEDULE

This schedule is based on an 18-week semester. Activities for four days of a five-day week are presented for Weeks 2 to 17. Beginning with Week 2, the fifth day is scheduled for writing a weekly journal of students' experiences. One week is left open in this schedule to accommodate field trips, videotape presentations or speakers from the community.

Week 1:

- Getting Started
  - Rules
  - Student Database
  - Course Calendar
  - How Computers Work Activity
  - Keyboard Tutorial
  - Historical Events

Week 2:

- Word Processing
  - Editing Commands
  - Handling Files
- Database Privacy
  - Discussion on Privacy

Week 3:

- Database Privacy
  - Computer Applications
  - Community Databases Project

Week 4:

- Database Privacy
  - Community Databases Project (Continuation)
- Computer Crime and Ethics Handout

Week 5:

- Database
  - Creating
  - Inputting
- Word Processing
  - Block Moves

Week 6:

Computer Crime and Ethics Handout

Database
- Search and Update
- Information Retrieval
- Class Discussion

Week 7:

Database Privacy
- Interviews

Database
- Class Database: Book Reviews

Week 8:

Database Privacy
- Interviews

Database
- Report Generator Demonstration
- Class Discussion

Computer Crime and Ethics Handout

Week 9:

Spreadsheet
- INTRO file
- BICYCLE file
- DISHES file
- FUDGE file

Journals
- First Half Printouts

Week 10:

Spreadsheet
- Plate Lunch Activity

Database Privacy
- Group Report Preparation

Week 11:

Database Privacy
- Group Report Presentations

Computer Crime and Ethics Handout

(Optional) Videotape on Computer Applications or Impact

Week 12:

Graphics
- Introduction
- Lines

Week 13:

Graphics
- For-Next Loops

Week 14:

Graphics
- Stripes

(Optional) Speaker on Computer Careers

Week 15:

Graphics
- Animation

Computer Crime and Ethics Handout

Weeks 16 and 17:

Graphics Project

Journals
- Second Half Printouts

GETTING STARTED

Description

Initial activities should promote positive attitudes toward computer use, establish course expectations and review introductory computer concepts, skills and knowledge.

Course Objectives

1.a. Identify and explain terms relating to computer hardware.

1.b. List and describe different methods/devices for input, output and data storage.

1.c. Describe functions of the central processing unit.

2.a. Interact with pre-packaged computer programs.

3.a. Describe historical evolution of calculating tools and the problems that motivated their development.

Materials Needed

1. Getting Started, Handout #1, Rules for the Classroom and Computer Lab, one per student. (A sample is provided on page --.)

2. 3x5 index card, one per student.

3. Materials and resources for a lesson such as "How Computers Work," Exploratory Computer Literacy Curriculum Guide, Grades 7-8, pp. 43-45.

4. Introductory software on use of the computer or keyboard tutorial, e.g., "Apple Presents Apple" for the Apple //e, "Exploring the IBM Personal Computer" for the IBM PC.

5. Envelopes, one per group of four students containing:
   Getting Started, Handout #2, Sample Historical Events, p. --, cut into strips,
   Adding machine tape in 36" lengths, and
   A bottle of rubber cement.

Teaching Sequence

1. Establish classroom and computer lab rules. Provide each student with a copy of Handout #1 and discuss rules with the class. Have students contribute additional or revised rules. Duplicate agreed upon rules for each student. Make a poster to display rules on bulletin board.

2. Give each student a 3x5 index card to complete with student information such as name, address, phone number. In addition, ask students to include information on something personal; e.g., how much allowance each receives. Note students' reactions when they are asked to write their responses to this last item, as the cards will be used later to introduce the unit on Database Privacy.

3. Go over the calendar and due dates for the course. Highlight the due dates for each activity.

4. Present activity on "How Computers Work," or similar lesson.

5. Hands-on Activity: keyboard tutorial to introduce/review the computer students will be using.

6. Sample Historical Events. Divide the class into groups of no more than four. For each group, prepare an envelope containing items listed under #5 in Materials Needed section.

   Have students draw a timeline indicating century intervals on the adding machine tape from 1400 to 2000. Each group should arrange the historical events in chronological order, glueing the strips to the approximate year on the timeline.

   Align each group's results on the board and discuss the results. Ask students to research the actual dates of these events and create a class timeline.

SAMPLE RULES FOR THE CLASSROOM AND COMPUTER LAB

1. Students must listen to all instructions.
2. Students should follow directions carefully.
3. Students should cooperate with partners and group members.
4. No food or drinks, including gum chewing is allowed.
5. No game disks are allowed.
6. No illegal copying of disks will be permitted.
7. Each pair is responsible for returning all disks to the designated place at the end of the period.
8. Students should be very careful of all cables and wires (coming from the computer and on the floor) to prevent accidents.

SAMPLE HISTORICAL EVENTS

Columbus discovered America.

Scottish mathematician, John Napier, invented Napier's Bones, which were rods that helped people multiply large numbers.

French mathematician, Blaise Pascal, invented the Arithmetic Machine which could add and subtract numbers.

German mathematician, Gottfried Wilhelm von Leibnitz, invented the Stepped Reckoner, which could add, subtract, multiply and divide.

The Declaration of Independence was signed.

Frenchman, Joseph Jacquard, invented the first punched cards which were used to control the operation of a loom.

English inventor, Charles Babbage, designed the first calculating machine called the Analytical Engine.

Mathematician, Lady Ada Augusta Lovelace, was the first programmer.

The first typewriter was invented.

Alexander Graham Bell invented the first telephone.

Herman Hollerith aided The U.S. Census Bureau by building the first tabulating machine.

World War II began.

American Engineer, Howard Aiken, built the first electromechanical computer called the Mark I.

John Mauchly and Presper Eckert designed the first all-digital computer called ENIAC.

The transistor was invented.

The first microcomputer was developed.

I was born.

WORD PROCESSING

Description

Word processing is introduced as the first tool application to enable students to use the word processor to maintain a weekly journal summarizing activities for that week. Word processing commands covered include creating a document, saving and loading a file, editing functions (insert, delete, strikeover, and block moves), and printing a document.

Course Objectives

1.d. Identify and explain terms relating to computer application and system software.

2.a. Interact with pre-packaged computer programs.

2.b. Identify features of each application software introduced; e.g., word processors, computerized databases, electronic spreadsheets, graphics and communication tools.

2.c. Identify uses of application software in the student's environment.

3.a. Describe historical evolution of calculating tools and the problems that motivated their development.

Materials Needed

1. Word processing program diskettes, one per computer.

2. Blank diskettes, one per student.

3. Data diskette with document file containing errors for students to correct, one per computer. Word Processing Handout #1, Sample Document, may be used.

4. Reference Notes for the word processing program being used. Word Processing Handout #2, Bank Street Writer - Reference Notes, is provided as a sample.

Teaching Sequence

1. The teacher should be familiar with the word processing program and the accompanying manual.

2. Have students boot the word processing program. Briefly explain any menus. Distribute Handout #2, Reference Notes.

3. Use the Reference Notes to:
   -Load the Sample Document file.
   -Go over the editing procedures for strikeover, delete, insert.
   -(Optional) Go over procedures for block moves.

   Do a few sample corrections of each kind together. Then have students complete correcting the document. In the Sample Document provided in Handout #1, the first paragraph contains errors that require strikeovers to change one character to another; the second paragraph, delete; the third paragraph, insert; and the fourth, a combination of all three.

   Depending on students' backgrounds, block movements of text may be introduced at this time. If the majority of students have had experience using a word processor, block moves should be demonstrated. Students should then be asked to place paragraphs on the Sample Document file in chronological order. If students have not had prior experience with a word processor, the chronological order should be discussed.

   If printers are available, have a few students print their corrected document. Go over the different print options available.

4. The skills learned in this unit will be applied throughout the course in writing weekly journals, business letters and group reports. Additional word processing applications in school, the home and the community should be discussed where appropriate.

SAMPLE DOCUMENT

In 1834 Englash mathematician Charles Babbage designdd the Analytical Engine. It wuz supposed to perform many of tha tasks that a modorn computer cen now do, but due to the limited technology uf the times, he coold not complete all the pards.

Blaise Pascal invvented the first countting machine while helping his fatther in the tax office. The Pascaline worked one a system off gears, much like an odometer in an automobiler.

About 5000 years ago the Chines invented thefirst calculating device caled the abacus. A base-10 system of beads, the abacs is still used today by mny oriental businessmen. Some ofthem can calculate faster with an abacus than wit a hand-held calculator.

Frustrated wit the backlog of date at the Census Bureau, Herman Hollerith inventted an electrictabulating machine. This machone could tabulate thet census three times faster than tha previous mechanical wy. Hollerith started his own compny which soold his tabulating machines ti businesses and became bery successful. Hes company eventualy became nown as Interrnational Businesss Machines (IBM).

BANK STREET WRITER - REFERENCE NOTES
(Apple //e 48K version)

To WRITE a document:
- a) Get into the WRITE mode.
- b) Type your document.
- c) To indent for a paragraph, space 5 times.
- d) Use the <RETURN> key at the end of a paragragh or if you are in the middle of a line and want to begin a new line; not at the end of the screen.

To CHANGE a character from one into another:
- a) Get into the EDIT mode.
- b) Place cursor under the letter that you want to correct.
- c) Press <ESC> to get into the WRITE mode.
- d) Type the correct letter. The incorrect letter is still there.
- e) Type the right arrow key to delete the incorrect letter.
- f) Press <ESC> to return to EDIT mode.

To DELETE a character or space:
- a) Get into the EDIT mode.
- b) Place the cursor under the letter or space you want to delete.
- c) Press <ESC> to get into the WRITE mode.
- d) Type the right arrow key to delete the incorrect letter or space.
- e) Press <ESC> to return to the EDIT mode.

To INSERT a character or space:
- a) Get into the EDIT mode.
- b) Place the cursor at the spot where you want to make an insertion.
- c) Press <ESC> to get into the WRITE mode.
- d) Type what you want to insert (character, word, line or space).
- e) Press <ESC> to return to the EDIT mode.

To SAVE your document:
- a) Get into the EDIT mode.
- b) Use the apple keys to highlight TRANSFER MENU and press <RETURN>.
- c) Use the apple keys to highlight SAVE and press <RETURN>.
- d) Answer the questions accordingly by typing Y or N.
- e) Type a filename and press <RETURN>.
- f) The computer will ask you for a password. If you want to protect your document, type a password and then press <RETURN>. Otherwise, just press <RETURN>.

To PRINT your document:

a) Get into the EDIT mode.
b) Use the apple keys to highlight TRANSFER MENU and press <RETURN>.
c) Use the apple keys to highlight PRINT FINAL and press <RETURN>.
d) Default all print options (press <RETURN> for all questions).

To RETRIEVE or load a previously saved document:

a) Get into the EDIT mode.
b) Use the apple keys to highlight TRANSFER MENU and press <RETURN>.
c) Use the apple keys to highlight RETRIEVE and press <RETURN>.
d) Type <Y> for the catalog.
e) Type the filename and press <RETURN>.
f) If you protected the document with a password, type the password and press <RETURN>. If you didn't protect your document, just press <RETURN>.

To CLEAR text from the workspace:

a) Get into the EDIT mode.
b) Use the apple keys to highlight TRANSFER MENU and press <RETURN>.
c) Use the apple keys to highlight CLEAR and press <RETURN>.
d) The computer will ask you if you are sure you want to clear. Press <Y> for yes.

In the EDIT mode, you can scroll the document (other than the arrow keys) by using the following keys:

B - cursor moves to the beginning of the document
E - cursor moves to the end of the document
D - cursor moves down 12 lines
U - cursor moves up 12 lines

DATABASE PRIVACY

Description

Students explore the meaning of the word, "privacy," by reflecting on personal experiences. The index cards completed in the Getting Started unit are used to create a class data base. Group projects dealing with data bases in the community enable students to further examine the question of privacy.

This unit is adapted with permission from two sources:

> Sample Activity: Data Bases and Privacy, from My Students Use Computers: Computer Literacy in the K-8 Curriculum* by Beverly Hunter, pages 213-214; copyright (c) 1984 by Reston Publishing Company, Reston, Virginia,* and
>
> On Privacy, from Teacher Training Program Leader's Handbook by Law in a Free Society, pages 53-56; copyright (c) 1978 by Center for Civic Education, Calabasas, California.**

Course Objectives

2.c. Identify uses of the application software in the student's environment.

3.b. Identify computer applications in business, schools, science, government and social sciences.

3.c. Discuss impact of technology on the workplace.

3.d. Discuss issues related to computer use and misuse.

Materials Needed

1. Privacy Handout #1, What Is Privacy?, one per student.
2. 3x5 index cards, containing student information from Getting Started unit.
3. Privacy Handout #2, Sample Questions for Interview, optional.
4. Privacy Handout #3, Additional Sample Interview Questions, optional.

*Reproduced with permission of Prentice-Hall, Englewood Cliffs, New Jersey.

**Reproduced with permission of Center for Civic Education

5. Privacy Handout #4, Sample Cover Letter to Businesses, for teacher only.

6. Telephone book for addresses of businesses and government agencies to be interviewed.

Teaching Sequence

1. Before students begin their group projects of interviewing managers of businesses and government agencies, the teacher should make initial contact to apprise them of the project and to expedite the scheduling of interviews.

2. Handout #1, What Is Privacy?

   a. Write the word "privacy" on the board. Ask students to define the word. Write all answers on the board. Discuss responses and agree on one definition.

   b. Distribute Handout #1. Allow students time to complete their responses individually.

   c. Break students up into groups to share their answers for circles A-C, and their reasons. Have one person summarize the group's discussion. After each group reports, discuss major similarities and differences in responses among the groups.

3. Index Cards from Getting Started Unit.

   a. Explain that the index cards completed by the class is a form of a database. The group of cards for the class is a file. Each card is a record. Each item is a field.

   b. Discuss the following questions:

      How did you feel when asked to write your phone number, even if it were unlisted?

      How did you feel when asked to write the amount of your allowance?

      How did you feel when others said they had no allowance? received it every two weeks? once a month?

      Should that kind of information be on a class database? What information should or should not be on a class database?

      What information should be available to whom? For example, should student telephone numbers be available to other students?

4. Group Project: Community Databases

   a. Ask students to brainstorm the kinds of databases found in the community; e.g., hospital records, bank accounts, police records.

   b. Divide the class into groups of no more than four students. Assign each group a business or government agency to interview . (Note: Police records are kept only at the main station.) Have students write the questions they would like to ask about privacy of databases. You may choose to distribute Handouts #2 and #3 to each group. Set due dates.

   c. Have each group compose a letter requesting an interview with the manager of the business or government agency concerning its database system and safeguards for privacy. Students should include some of their interview questions in their letter and request a reply within two weeks.

   d. Teacher should proofread the letters and have students prepare letters on a word processor in business letter format. Have a telephone book available for students to find addresses.

   e. Teacher should attach a cover letter on school stationery to the each group's letter and mail.

   f. In preparation for the interview, have students discuss the importance of appearance and behavior. Have students prepare a script and role play with each other. Discuss any problems students think they may encounter. Be sure that students understand the purpose of the interview and the nature of the information they are gathering.

   g. If students do not receive a reply to their letter within the time allotted, ask students for ideas to solve that problem. This creates a problem-solving situation for the group or the class to address.

   h. Provide students with enough time in groups to compile their data and prepare their group reports. Reports, either oral or written, should include a summary of the interviews and conclusions about databases and safeguards for the privacy of information: Were students surprised at the kind of information being kept? Who had access to that information? Do students feel that the laws adequately protect personal information? What did students learn from this experience?

WHAT IS PRIVACY?*

1. For circle A, write information that you are willing to share with strangers; e.g., businesses, adults you do not know.

2. For circle B, write information that you are willing to share with acquaintances; e.g., classmates, neighbors.

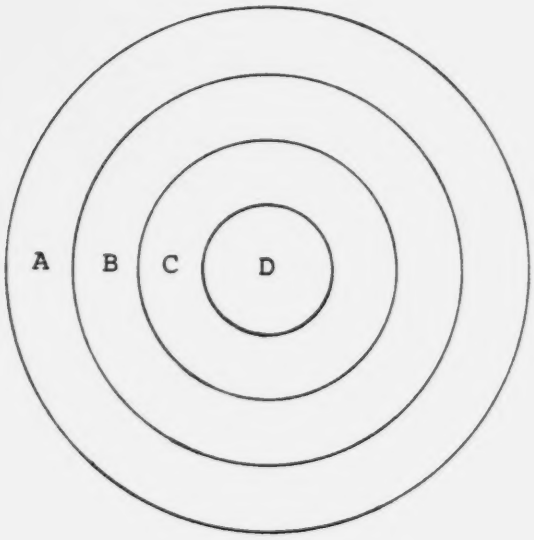
3. For circle C, write information that you are willing to share with close friends, relatives or parents.

4. For circle D, think about information that you are not willing to share with others.

5. Be prepared to discuss the following questions:

   Look at your lists for each circle. Why did you feel you were willing to share in some situations and not in others?

   Did you discover anything about your need for privacy? Were you surprised?



Adapted from Teacher Training Program Leader's Handbook, by Law in a Free Society, pages 53-56; copyright (c) 1978 by Center for Civic Education, Calabasas, California, Reproduced with permission.

SAMPLE QUESTIONS FOR INTERVIEW

Below are some sample questions which you may want to ask in your interview. Add your own questions to the list.

1) Who can see the records? (for example, investigators, government agents, welfare officials)

2) Could the police see them if they wished?

3) Could your parents?

4) Can you see them? If not, can you see them when you are an adult?

5) Are the records computerized?

6) How long are records kept?

7) How are records protected?

8) Who decides who can see what records?

9) Are there any laws protecting the records?

ADDITIONAL SAMPLE INTERVIEW QUESTIONS

Banks

1. What kinds of information do banks keep on customers?
2. What kinds of information do banks have access to (for credit)?
3. Does the kind of account, e.g.,savings, loan, make a difference?
4. Pick up a credit application - what kind of information is asked for?
5. What procedures do banks need to follow before releasing personal information to the credit bureau?

Medical

1. What kinds of information are on your medical records?
2. If you have a communicable disease, what are doctors required to do with that information?
3. What kinds of injuries or illnesses must be reported to the authorities; e.g., gunshot wound, child abuse?

Police

1. To what kinds of information do police have access?
2. Is there a record only after a violation?
3. Is there a record on the victim? If so, how long is it kept?
4. What happens to the information received through Crimestoppers? How is the anonymity of the caller assured?

Merchants

1. Are courtesy cards given to all customers that apply?
2. Who provides information on overdrawn checks and invalid credit card lists?
3. How does a store check customer's credit record?

PRIVACY
Handout #4

SAMPLE COVER LETTER TO BUSINESSES

Date

Name of Company/Agency
Address
City, State Zipcode

Dear Manager/Director:

The students at _____ Intermediate School, who are enrolled in a computer literacy course, are presently studying databases and issues related to privacy of such information. Gathering information through an interview from a company/agency such as yours would be a valuable learning experience. In addition to learning about data base systems in our community, the students will also be applying their oral and written communication skills.

Any assistance that you can provide to support the activity described further in the attached letter would be greatly appreciated.

Sincerely,

_____
(Teacher's Name)

Attachment

COMPUTER CRIME AND ETHICS

Description

The widespread use of microcomputers in the school and the home has raised social issues and moral dilemmas that must be addressed by students and their teachers. One way to prepare students to handle the moral and ethical issues is through open-ended discussions which focus on the reasons students provide to justify their conclusions, rather than on a resolution of the dilemma.

This unit is based on two articles by Larry S. Hannah and Charles B. Matus:

> "Teaching Ethics in the Computer Classroom," Classroom Computer Learning, April/May 1984.*
>
> "A Question of Ethics," The Computing Teacher, August/September 1984.*

Course Objectives

3.b. Identify computer applications in business, schools, science, government and social sciences.

3.c. Discuss impact of technology on the workplace.

3.d. Discuss issues related to computer use and misuse.

Materials Needed

Handouts describing situations dealing with ethical issues. Sample Handouts are included.

Teaching Sequence

The class should be divided into groups of four students to foster discussion. In each situation, the students' task is not to reach group consensus on the proper action, but rather to examine the consequences and implications of alternative courses of action.

The teacher should decide whether the same situation is discussed by each group or whether different situations are provided to different groups. In either case, each group should report back to the entire class, summarizing the alternatives discussed and the consequences or implications of each alternative.

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The teacher's role is to encourage student discussion and to focus the discussion on the reasons and justifications for conclusions reached or actions recommended.

This unit should be initiated early in the semester to enable the class to discuss any dilemmas and issues raised in relation to activities being conducted by the students.

DETECTIVES*

Jim and Maria were contacted by a private detective who had heard that they were computer experts. The private investigator offered to pay Jim and Maria to help him solve a case. He said it would be OK for them to tap into the protected data base he needed to access because it would be for a good cause - solving a crime. He also said that since he was a detective, he would be able to get most of the information anyway, but the computer would save him precious time.

Jim thought that he and Maria should help the detective. "It's for a good cause," he explained, "and it's a good way to make some extra cash. Besides, we're not going to change or dump any of the information. We're just going to find out what some other people already know." Maria was uncertain; she had a feeling it wouldn't be right to get information about people without their knowledge - information that quite possibly would be used against them.

Should they help the detective? Why or why not? If they do help him and are caught, whould they be charged with invasion of privacy and violation of Federal Communications Commission regulations?

*From "Teaching Ethics in the Computer Classroom" by Larry Hannah and Charles Matus, Classroom Computer Learning, April/ May 1984, pages 34-36. Reprinted with permission from Larry Hannah, California State at Sacramento, 6000 J. Street, Sacramento, CA 95819.

SIGN ON THE LINE*

Two months ago Jon thought he had it made and visions of dollars were rushing through his head. But now he was on an emotional roller coaster. It all started when Leisure Time Software offered him a contract to distribute his game Zero Time.

Jon had gotten the idea for Zero Time three months earlier when he had become fascinated with Zap. Only a week after Zap's arrival at the local arcade, so many kids wanted to play it that Jon had to wait three to four hours for his turn. "If only it were available for my Pelican Computer," Jon had thought, "I wouldn't have to spend my evenings standing in line."

One day shortly afterward, Jon was reworking an old game he had written. Like all his other games, it was fun but not quite fast or interesting enough to sell.

Suddenly Jon had an inspiration. He knew exactly how he could program Zap for his Pelican. He was excited because he knew that no one had yet produced a similar game for a home computer.

A week later, Zap - renamed Zero Time - was ready. Its aliens and ships were identical to Zap's; the speed was as good. Although Jon couldn't reproduce all of Zap's special effects, Zero Time was better in some ways than the original. Jon had introduced a ceremony in which the aliens knelt when defeated, and he'd vastly improved the sound effects.

Jon didn't need his friends to tell him that he had a winner - but of course they did anyway. Members of the local computer club gobbled up copies; long-lost friends called up to see if they could have a crack at playing his game; and Leisure Time Software, a local company, offered a thousand dollars up front plus royalties for rights to the game.

Just as he was ready to sign the contract with Leisure Time, Jon read about a contest sponsored by Pelican Computer Company. The first prize was $20,000 plus royalties from sales. Jon had no doubts about what to do: forget Leisure Time! He was going to win and have a start at becoming a millionaire at 20!

But then he got the bad news. Pelican Computers had eliminated his program from the contest because it looked too much like Zap. The company said that publishing Zero Time would violate copyright laws.

"That's not fair," Jon thought. "I may have gotten the idea from Zap, but I wrote Zero Time. I didn't copy anybody's source code. In fact, my program has to be completely different because the two machines don't even use the same chips. Besides, I added sound effects and the kneeling alien routine."

The people at Leisure Time agreed with him and still wanted to publish his program. The company even agreed to give Jon an extra $500 to sign a contract.

Should Jon sign the contract? Why or why not?

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COPYRIGHT OR WRONG?*

Sam had a problem. The thing he wanted to do more than anything else in the world was spend time playing Starbase Commander. The Galloping Goblins game he had was good, but after playing a single game of Starbase Commander at Lynn's, he knew he had to have it. His problem was that he didn't have the 50 dollars to buy the game.

Just when he had about given up hope of ever getting Starbase Commander, Lynn called. "I just got a program that we can use to make you a copy of Starbase Commander. I'd love to have a copy of Galloping Goblins. Come on over and we can trade programs."

Sam wasn't sure. Was it wrong to do it? When Sam questioned Lynn, she seemed perplexed. "It's just like taping a record." she said. "It's not really stealing or anthing like that."

Sam wasn't convinced. Somehow, it didn't seem right. "Are you certain that it's OK?"

"Sure," Lynn responded, "after all, doesn't your dad make copies of movies with his videocassette recorder? You tape records for your stereo all the time. And anyway, the computer company got its money for one disk.

Should Sam make a copy of the program? Would it be wrong or right? Why? If Sam and Lynn were discovered making copies of copyrighted software, what, if anything, should happen to them?

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VINCE'S PRIDE*

It was the big day at computer camp. All week long everyone had been talking about the upcoming visit by the film crew from the "Good Morning Show." A chance to be on national television! All of the campers had been working hard on their programs hoping to impress the crew and become a star.

From the start, Vince had known exactly what he wanted to do. He had put together a wild pattern-generating routine that was the best around. All he needed was the sound to go with it. He thought that he knew how to do it, but somehow he just couldn't get the sound to come out right.

Hoping to find the source of his problem, he borrowed a disk with a song that one of the instructors, Susie, had programmed.

While Vince was running Susie's program, the television crew walked in. "That's absolutely perfect!" a woman exclaimed. "We can show that kid working on the computer and then keep his music running while we show some other shots of campers at their computers."

"Let's do it," the man with her said.

Vince started to say that the music wasn't his, but they were already getting the camera ready. Vince thought, "They didn't ask me if I wrote it, so I'm not lying. Besides, it'll do so much for my pattern program."

Is it important for Vince to offer the fact that the music wasn't his work? Why or why not?

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DATABASE

Description

Databases are collections of related information stored in an organized, systematic manner. They may take the form of card files, filing cabinets and computer programs. The term "database" usually refers to a computerized database.

Databases are becoming an increasingly important tool for storing and retrieving data in our information society. The speed at which the computer can locate and retrieve information has made it invaluable in tasks that involve cross-referencing and analysis of information.

In this unit students use a database software package to create, develop strategies for retrieving information, and update a database. A similar activity, "Designing a Data Base for Book Reviews," is included in the Exploratory Computer Literacy Curriculum Guide, Grades 7-8, pages 65-67.

Course Objectives

1.d. Identify and explain terms relating to computer hardware.

2.a. Interact with pre-packaged computer programs.

2.b. Identify features of each application software introduced; e.g., word processors, computerized databases, electronic spreadsheets, graphics and communication tools.

2.c. Identify uses of the application software in the student's environment.

2.d. Develop skills for using the application software as a tool in problem solving and decision making.

3.b. Identify computer applications in business, schools, science, government and social sciences.

Materials Needed

1. Database software program diskettes, one per computer.

2. Student data diskettes, one per student.

3. Either Database Handout #1, one per student, or database file containing information on Handout #1, one per computer.

4. Database Handouts #2 - #5, one per student.

Teaching Sequence

1. The teacher should be familiar with the database software package.

2. Distribute Handout #2. Develop definition of terms, "database" and "information retrieval." Distinguish the terms: file, record, field. Give examples of database systems: a file is the collection of student information on index cards filled out at the beginning of the semester; a record is an individual student's index card; a field is the student's phone number.

3. Sample Database Activity (Handout #1 or prepared database file). Handout #3 Database Retrieval Specifications.

   Have students boot database software program. Introduce the commands available on the menu.

   If the data diskettes were not prepared in advance, distribute Handout #1 and have students enter information carefully. Emphasize need for consistent format; e.g., Cumulative GPA must be in the N.NN format.

   Go over retrieval specifications on Handout #3 as a hands-on activity. The sample provided is for PFS:File on the Apple //e.

4. Handout #4 is designed to reinforce strategies for retrieving information. Alternatives for using this worksheet include having students complete the worksheet in the classroom or for homework, and then using the computer to verify their responses. As there are many ways to conduct a search, the concept of efficiency in searching a database should be discussed.

5. Handout #5 is designed to create a class database of book reviews. Suggestions for management include:

   Have students prepare their book reviews on Handout #5 prior to sitting at the computer.

   After all students have entered their book reviews on their data diskettes, be sure to combine individual records into one master disk for the class database. (Use the COPY function for PFS:File.)

   Have each student create two questions related to the book review database and identify the appropriate retrieval specification. These could be combined for a class worksheet.

6. Discuss the advantages and disadvantages of the book review database. How can the database be improved?

   Discuss applications of databases in the school environment.

7. Optional Follow-up. Use PFS:Report or similar report generator to create an alphabetical listing of all books read by the class. Generate a listing of only the fiction books according to their ratings.

SAMPLE DATABASE APPLICATION

Design:

Name:
Address:
City:
State:
Zipcode (NNNNN):
Phone (NNN-NNNN):

English grade:
Social Studies grade:
Math grade:
Science grade:
PE grade:
Art grade:

Cumulative GPA (N.NN):

Records:

Anderson, Jane	Baker, George
92-1164 Meheula Pkwy.	2049 Smith St. SB
Mililani Town	Wahiawa
Hawaii	Hawaii
96789	96786
623-4567	624-1105
A	C
B	B
A	C
B	C
A	A
A	B
3.50	2.67
Chun, Mary Ann	Dixon, Sharon
94-671 Kilani Pl.	1243 Kolekole Rd. SB
Mililani Town	Wahiawa
Hawaii	Hawaii
96789	96786
623-3378	624-7424
B	B
B	C
B	B
B	C
B	A
B	A
3.00	3.00

Esteban, Jose
401 Wili Cir. WAFB
Wahiawa
Hawaii
96786
624-2290

C
C
B
D
B
B

2.30

Fernandez, Richard
94-642 Kipapa Dr. #701
Mililani Town
Hawaii
96789
623-7660

A
A
A
A
A
A

4.00

Gibson, Sally
38 Kona Rd. SB
Wahiawa
Hawaii
96786

B
C
C
D
F
B

1.83

Hayashi, Lynn
99-064 Hokuahi Pl.
Mililani Town
Hawaii
96789
623-3333

C
B
C
C
B
B

2.50

Izu, Robert
98-355 Polapola Pl.
Mililani Town
Hawaii
96789
623-5042

A
A
B
B
B
B

3.20

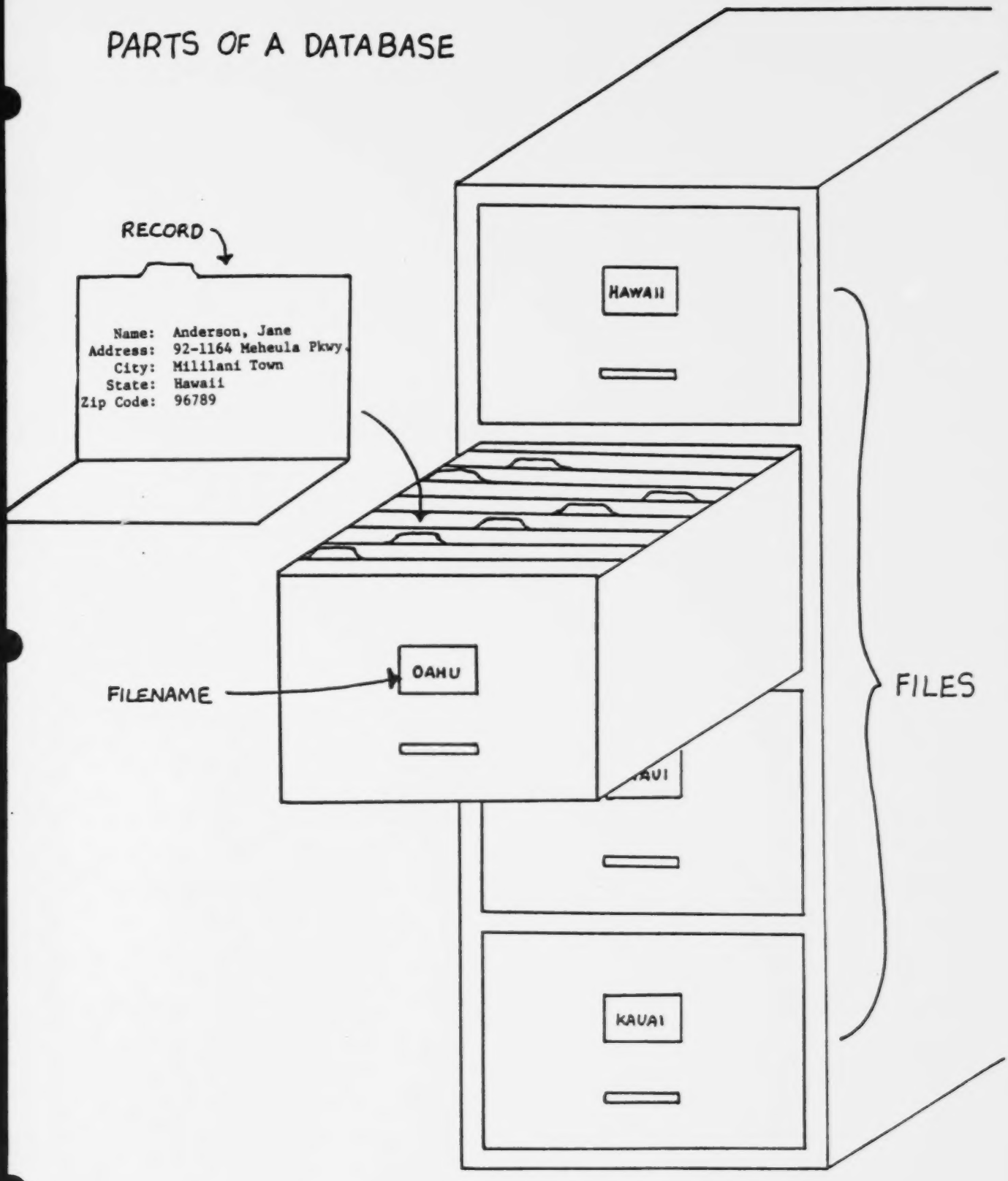
Jones, June
3456A Helu Pl. WAFB
Wahiawa
Hawaii
96786
625-6457

D
C
B
C
C
C

2.00

Kaneshiro, Sharon	Luzer, Don
94-148 Waikalani Dr.	1140 Cane St.
Wahiawa	Wahiawa
Hawaii	Hawaii
96786	96786
623-9213	622-4466
B	F
B	D
C	F
B	F
C	B
A	D
2.83	0.83

PARTS OF A DATABASE



DATABASE RETRIEVAL SPECIFICATIONS
For PFS:File on Apple //e

To select SEARCH/UPDATE, enter a 4 in SELECTION NUMBER and the name of the file you wish to search through in FILE NAME at the Main Menu. Press <CONTROL><C>.

There are 5 categories of retrieve specifications. You can enter a retrieve specification in as many items of the form as you wish.

1. FULL ITEM MATCH - FILE looks for forms on which the characters in an item match the characters that you entered in the same item on the retrieve spec.

2. PARTIAL ITEM MATCHES - Use if you do not remember exactly how an item of information is entered in a file.
   a) ..Word — tells FILE to ignore whatever characters occur before Word
   b) Word.. — tells FILE to ignore whatever characters occur after Word
   c) ..Word.. — tells FILE to ignore whatever characters occur before or after Word; or to look for Word anywhere in the item

3. NUMERIC ITEM MATCHES - When a number has no numeric value (for example, a phone number or date), you can use either a FULL ITEM MATCH or a PARTIAL ITEM MATCH. But if the number has an arithmetic value, it is then possible to look for all items less than, greater than, or equal to that given number.
   a) <number — tells FILE to find all values less than the number
   b) >number — tells FILE to find all values greater than the number
   c) =number — tells FILE to find that number

4. NUMERIC RANGE MATCH - Allows you to search for numeric values within a certain range.
   a) =number..number — tells FILE to find all values between the two numbers

5. THE "NOT" MATCH - Reverses any of the above specifications. For example, /Word means to find all items that are not Word.

SAMPLE DATABASE APPLICATION
RETRIEVE SPECIFICATION EXERCIES

Directions: For each problem, write the field(s) and retrieve specification(s) that will enable you to find the answer. Then write the answer.

1. How many students are in the file?

2. What is George Baker's phone number?

3. Who lives at 98-355 Polapola Pl.?

4. How many students live in Mililani Town?

5. Who got a C in PE?

6. Suppose you were doing poorly in Math and were looking for a tutor (or someone to help you). Who would you call?

7. How many students live in Wheeler Air Force Base (WAFB)?

8. You wanted to invite Richard to your birthday party but you couldn't remember his last name. How can you solve that problem?

9. What is the ratio of the number of students receiving A's in Art to the number of students receiving B's?

10. Who made the honor roll?

11. Do all students whose telephone numbers begin with 623 live in Mililani Town?

12. At this school, a student must maintain at least a 1.0 grade point average (GPA) in order to be promoted to the next grade. Who wasn't promoted?

DATABASE
Handout #5

BOOK REVIEW

Title:

Author:

Publisher:

Copyright (NNNN):

No. of Pages (NNNN):

Kind (Fiction or Non-Fiction):

Theme:

Level of Difficulty (1=easy to 5=hard):

Rating (1=Junk to 5=Terrific):

Reviewed by:

Synopsis:

ELECTRONIC SPREADSHEET

Description

Electronic spreadsheets can be used as an aid in budgeting, projecting sales and making financial forecasts. Once an electronic spreadsheet is set up with titles, numbers and formulas, the computer uses the formulas to calculate and recalculate data on the spreadsheet. If a number on the spreadsheet is changed, all other related numbers on the spreadsheet are changed automatically, as the computer recalculates all relevant formulas.

This unit provides an overview of the capabilities of an electronic spreadsheet. Students will use prepared spreadsheets to learn data entry commands, file management commands and simple applications. The final activity involves creating a simple worksheet. The sample activities are based on VisiCalc.

The initial activity is similar to "Introduction to Spreadsheets," Exploratory Computer Literacy Curriculum Guide, Grades 7-8, pages 79-81. The subsequent activities are based on "Teach Dollars and Sense with Spreadsheets," by J. Craig Dickinson, Teaching and Computers, March 1985, pages 12-19.*

Course Objectives

1.d. Identify and explain terms relating to computer hardware.

2.a. Interact with pre-packaged computer programs.

2.b. Identify features of each application software introduced; e.g., word processors, computerized databases, electronic spreadsheets, graphics and communications tools.

2.c. Identify uses of the application software in the student's environment.

2.d. Develop skills for using the application software as a tool in problem solving and decision making.

3.b. Identify computer applications in business, schools, science, government and social sciences.

3.c. Discuss impact of technology on the workplace.

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Materials Needed

1. Electronic spreadsheet program diskette, one per computer.

2. Prepared data diskettes with the following files: INTRO, BICYCLE, DISHES, and FUDGE, one per computer.

3. Student data diskettes, one per student.

4. Spreadsheet Handouts #1 - #4, one per student. Handouts are based on VisiCalc.

Teaching Sequence

1. The teacher should be familiar with the electronic spreadsheet program and the accompanying manual.

2. Prepare a data disk with the following files:
The teacher may choose to prepare the disks without the formulas.

a. INTRO

	A	B
1	NUMBER	
2	HALF	
3	TWICE	
4	TIMES 3	
5	PLUS 5	
6	MINUS 2	
7	TIMES 25	
8	PLUS 100	
9	25% OF	
10	SQUARED	

b. BICYCLE

	A	B
1	BICYCLE	$120
2	WEEKLY $	
3	NO. WEEKS	+B2*B3

c. DISHES

	A	B
1	WASHED	
2	BROKEN	
3	EARNED	+(B1*.01)-(B2*.05)

d. FUDGE

	A	B
1	FUDGE	
2	EXPENSES	+B1*.05
3	PRICE	
4	EST SALES	
5	INCOME	+B3*B4
6	PROFIT	+B5-B2

3. Have students boot the spreadsheet program. Briefly explain the different areas of the screen: status area, window, cursor, cursor movement keys, rows, columns, cells.

   Acquaint students with the three types of data entry: label, value, formula. Have students try samples of each.

   Have students load the file INTRO to demonstrate the recalculation feature of the spreadsheet. Work as a class to fill in the formulas for cells B2 to B10. Have students enter a number in cell B1 while watching the screen. Change numbers and observe results on the screen.

4. Handouts #1-#3 allow students to practice on simple models developed to answer "What if..." questions.

5. Handout #4 assists students in creating a simple model to solve a problem based on purchasing plate lunches.

SPREADSHEET
Handout #1

AMY'S BICYCLE*

Amy wants to buy a bicycle that costs $120. As Amy's best friend and financial adviser, you must help her figure out how long she will have to work to earn enough money for the bicycle.

Load your spreadsheet program into the computer and load the file named BICYCLE. Use this spreadsheet to answer the following questions:

1. a) Amy earns $8 per week babysitting. Enter this figure in cell B2. (Move the cursor to B2. Type 8. Press <RETURN>.) How much money will Amy earn in 10 weeks?

   b) How much money will she earn in 18 weeks?

   c) How many weeks will it take her to earn enough money for the bicycle?

2. If Amy earns an extra $4 per week mowing lawns, how many weeks will it take her to earn $120?

3. What if Amy can only work for six weeks? How much in earnings will she have to average each week to buy the bicycle?

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BROKEN DISHES*

Greasy Dave has offered you a job as a dishwasher at his drive-in. He says you can earn one cent for each dish you wash, but you will lose five cents for each dish you break.

Load your spreadsheet program into the computer and load the file named DISHES. Use this spreadsheet to answer the following questions:

1. Suppose you wash 50 dishes. Enter this number in cell B1. (Move the cursor to cell B1. Type 50. Press <RETURN>.) Suppose you break five dishes. Enter this number in cell B2. (Move the cursor to cell B2. Type 5. Press <RETURN>.) How much money will you earn?

2. If you wash 110 dishes and break 20 dishes, how much will you earn?

3. You break 10 dishes, but you earn a dollar. How many dishes did you wash?

4. On Friday the 13th, you wash 90 dishes, but earn only 10 cents. How many dishes did you break?

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SPREADSHEET
Handout #3

OH, FUDGE!*

You are the treasurer of the school computer club. The president of the club wants to sell fudge to raise money. Each piece of fudge costs five cents to make. Your job is to help the president figure out possible profits for such a sale.

Load your spreadsheet program and load the file named FUDGE. Use this spreadsheet to answer the following questions:

1. a) If the club makes 600 pieces of fudge, what are the expenses?
   b) If the club sells all the pieces at $0.50 each, how much profit will it make?
   c) If the club only sells 400 of the 600 pieces, but at $0.75 each, how much profit will it make?

2. a) The club has enough money to make 800 pieces of fudge. If the club charges $.55 per piece, how many pieces will it have to sell to make $345?
   b) How much profit will be made if it only sells 500 pieces?
   c) If the club charges $1 per piece and sells 400 pieces, how much profit will it make?

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SPREADSHEET
Handout #4

PLATE LUNCHES

You are going to Patsy's Chinese Kitchen to purchase lunches for 10 people and you have $35. You have to spend as much of the $35 as you can. What combination of plates will cost nearest to $35?

You are going to create a spreadsheet for this problem together as a class. If there is another spreadsheet currently on your screen, type /CY to clear.

1. In cell B1, enter PRICE (type PRICE and press <RETURN>) and then type /FR.
2. In cell C1, enter NO. and then type /FR.
3. In cell D1, enter COST and then type /FR.

4. In cell A2, enter PLATE#1; in cell B2, enter 2.65.
5. In cell A3, enter PLATE#2; in cell B3, enter 3.30.
6. In cell A4, enter PLATE#3; in cell B4, enter 3.90.

7. In cell C5, enter TOTAL and then type /FR.

8. Determine the formulae to enter in cells D2, D3, D4, and D5.

Use this spreadsheet to answer the following questions:

1. a) With $35, how many PLATE#1's can you buy?
   b) With $35, how many PLATE#2's can you buy?
   c) With $35, how many PLATE#3's can you buy?

2. List as many combinations as you can for 10 people with $35.

3. What combination of plates will cost nearest to $35?

Follow-Up:

Have students calculate 4% tax to their totals. Change TOTAL in cell C5 to SUBTOTAL, and complete appropriate labels and formulas.

Have students print their results.

LOW-RESOLUTION GRAPHICS

Description

Creating pictures with the computer is a fun way to introduce BASIC programming concepts. The output of the program is visual, allowing students to easily see and correct any programming errors. The use of color monitors enhances the activities, but monochrome monitors can also be used.

This unit is based on Applesoft BASIC, with activities adapted from Apple Graphics by Bob Hofemann.* The low-resolution graphics activities may be adapted for other languages that support graphics.

Course Objectives

4.a. Recognize that a computer language is needed to communicate with a computer.

4.b. Develop strategies and procedures for developing computer programs to solve problems.

4.c. Develop concepts of structured programming.

Materials Needed

1. BASIC program diskettes, one per computer.

2. Student data diskettes, one per student.

3. Graphics Handouts #1-#6, one per student.

4. Low-Resolution Graphics sheets, pages -- to --, approximately 3 per student.

5. Hardware or software interfaces for printing graphics. (See Teaching Sequence below.)

6. (Optional) If using color monitors, a chart or poster listing reference numbers for low-resolution colors.

Teaching Sequence

1. The teacher should have a working knowledge of BASIC commands and statements.

*From Apple Graphics by Bob Hofemann, pages 5, 9, 10, 12, 14, 16, 18, 24-26, 29, 32, 44; copyright (c) 1984 by Enrich Corporation, San Jose, California. Used by permission. Further reproduction is extended to buyers of this product.

2. NOTE: Low-resolution graphics cannot be printed directly from the Apple //e without appropriate interfacing. Graphics utility software available commercially, such as "Triple Dump" by Beagle Brothers or "Zoom Grafix" by Phoenix Software will print only high-resolution graphics. The Teacher Reference sheet provided on page -- includes a program for changing a low-resolution design to high-resolution for printing. Hardware solutions are also available, but are not included here as this area changes too rapidly.

3. Each activity below is designed to introduce a concept or command through a teacher-directed activity, followed by a hands-on activity based on the Lo-Res Handouts provided.

   Ideally, the teacher will have a large screen monitor to demonstrate effects of changing commands within a program. If not, students should be asked to explore short, sample program, followed by a class discussion to summarize students' observations and conclusions.

   a. Introduction to Low-Resolution Graphics

      Definitions: text screen
      graphics screen
      pixel

      Commands:

Graphics	BASIC
GR	RUN
COLOR=n	LIST
PLOT X,Y	NEW
TEXT	LOAD
	SAVE

      Teacher Demo: Demo #1 INTRODUCTION

      Hands-On: Handout #1 PLOT STATEMENTS

   b. Horizontal and Vertical Lines

      Commands: HLIN X1,X2 AT Y
      VLIN Y1,Y2 AT X

      Teacher Demo: Demo #2 LINES

      Hands-On: Handout #2 HORIZONTAL AND VERTICAL LINES

   c. For-Next Loops

      Commands: REM

```
FOR Y = I TO J STEP K
<BASIC statements>
NEXT Y
```

Teacher Demo:
- Demo #3 FOR-NEXT LOOPS I
- Demo #4 FOR-NEXT LOOPS II
- Demo #5 REM STATEMENT

Hands-On:
- Handout #3 FOR-NEXT LOOPS I
- Handout #4 FOR-NEXT LOOPS II
- Handout #5 STRIPES

d. Animation

Teacher Demo:
- Demo #6 ANIMATION

Hands-On:
- Handout #6 ANIMATION

CHANGING LOW-RES TO HI-RES GRAPHICS

To change a low-resolution graphic picture to high-resolution before printing, add the following steps to your Applesoft BASIC program:

```
HGR
FOR X=0 TO 39
FOR Y=0 TO 39
IF SCRN (X,Y) <> 0 THEN HCOLOR=3 : HPLOT 2*X, 2*Y TO
     2*X+1, 2*Y TO 2*X+1, 2*Y+1 TO 2*X, 2*Y+1
IF SCRN (X,Y) = 0 THEN HCOLOR=0 : HPLOT 2*X, 2*Y
NEXT Y
NEXT X
```

To save this picture, type:

```
BSAVE filename.PIC,A$2000,L$2000
```

LO-RES
Demo #1

INTRODUCTION

1. Introduce topic of low-resolution graphics, covering the following definitions:

text screen	text, words or numbers appear on the screen
graphics screen	picture elements (pixels) appear as rectangular regions of light
pixel	one rectangular region of light

2. Demonstrate each of the following low-resolution graphics commands:

GR	to activate the low-resolution graphics screen or to clear the graphics screen (similar to HOME in the text screen.)
COLOR=n	to set the color of the pixel; refer to the manual (or make a poster) for values of n corresponding to the various colors
PLOT X,Y	to locate the coordinates of the pixel where X is the horizontal abscissa and Y is the vertical ordinate
TEXT	to return to the text screen

3. Review the role of line numbers in BASIC and demonstrate or review the following BASIC commands: RUN, LIST, NEW, LOAD, and SAVE.

4. Have students type in the program below and RUN it. Then have students edit the program to change the color and add the "middle" point.

```
 10  GR
 20  COLOR=1
 30  PLOT 3,1
 40  PLOT 3,3
 50  PLOT 5,1
 60  PLOT 5,3
100  END
```

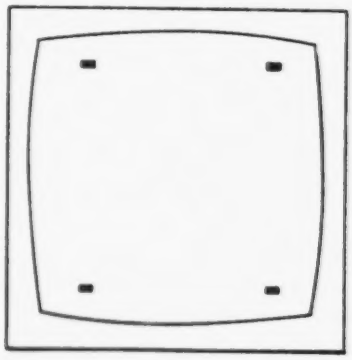
NOTE: To edit, type

TEXT
HOME
LIST

PLOT STATEMENTS*

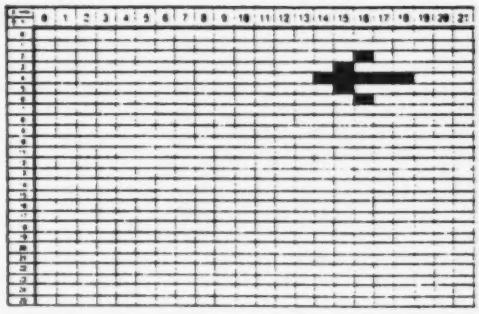
1. Write a program that will place a cell of color in each corner of your display screen.

```
 10  GR
 20  COLOR=15
 30
 40
 50
 60
999 END
```



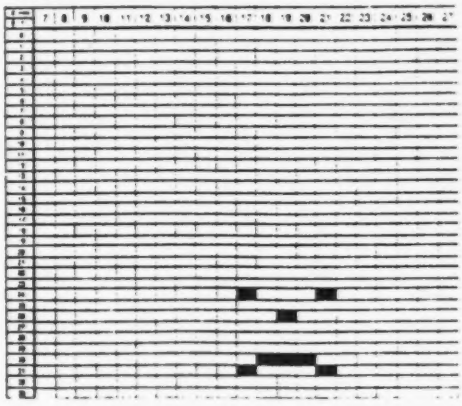
2. Type NEW and press <RETURN>. Write a program that will draw a red arrow.

```
 10                    70  PLOT 18,4
 20                    80
 30  PLOT 14,4         90
 40  PLOT 15,4        100
 50  PLOT 16,4        110
 60  PLOT 17,4        999  END
```



3. Type NEW and press <RETURN>. Write the PLOT statements that will turn the frown into a smile.

```
 10  GR                70  PLOT 19,30
 20  COLOR=15          80  PLOT 20,30
 30  PLOT 17,24        90
 40  PLOT 21,24       100
 50  PLOT 19,26       999  END
 60  PLOT 18,30
```



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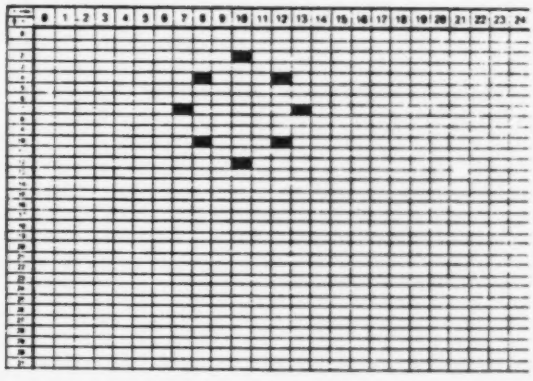
4. Write the program that PLOTS the circle shown below.



5. You are going to play the role of the computer. Using a low-resolution graph sheet and a pencil, shade in the PLOT commands in the program below and draw the figure.

```
 10  GR                    150  PLOT 13,9
 20  COLOR=15              160  PLOT 14,9
 30  PLOT 10,5             170  PLOT 10,10
 40  PLOT 12,5             180  PLOT 12,10
 50  PLOT 15,5             190  PLOT 15,10
 60  PLOT 17,5             200  PLOT 17,10
 70  PLOT 11,6             210  PLOT 11,11
 80  PLOT 16,6             220  PLOT 16,11
 90  PLOT 10,7             230  PLOT 10,12
100  PLOT 12,7             240  PLOT 12,12
110  PLOT 15,7             250  PLOT 15,12
120  PLOT 17,7             260  PLOT 17,12
130  PLOT 13,8             999  END
140  PLOT 14,8
```

6. Write a graphics program that will draw your initials. Use a low-resolution graphics sheet and shade in your initial before you write the program.

LINES

1. Have students type the following program:

```
 10  GR
 20  COLOR=1
 30  PLOT 1,5
 40  PLOT 2,5
 50  PLOT 3,5
 60  PLOT 4,5
 70  PLOT 5,5
999  END
```

   Ask the students to predict what the output would be. RUN the program. What does this program draw?

2. LIST the program. Do you see a pattern in the PLOT statements?

3. Introduce the HLIN statement.

```
HLIN X1,X2 AT Y where
    X1 is the starting column
    X2 is the ending column
    Y  is the row number
```

   Rewrite and RUN the original program using HLIN.

```
 10  GR
 20  COLOR=1
 30  HLIN 1,5 AT 5
999  END
```

4. Type NEW and then the following program:

```
 10  GR
 20  COLOR=6
 30  HLIN 3,12 AT 7
999 END
```

   Have students predict what the output will be and then RUN the program to check.

5. Change line 30 to VLIN 3,12 AT 7. Have students predict the outcome of the new program. What do the numbers 3, 12 and 7 represent? RUN the new program. Write the general form for VLIN on the board.

```
VLIN Y1,Y2 AT X where
    Y1 is the starting row
    Y2 is the ending row
    X  is the column number
```

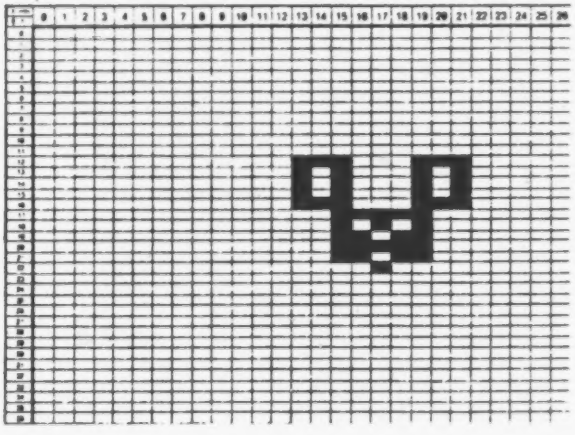
6. Handout #2

HORIZONTAL AND VERTICAL LINES*

1. Write a program that will draw a red heart. Begin with

```
 10  GR
 20  COLOR=1
 30  PLOT 14,20
 40  PLOT 20,20
 50  HLIN 13,15 AT 21
 60  HLIN 19,21 AT 21
 . . .
999  END
```

2. Write a program that will draw a gray mouse. Fill in pink ears, white eyes, a brown nose and a red mouth.



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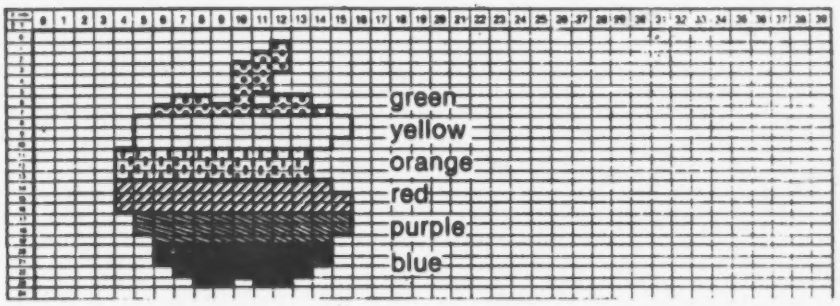
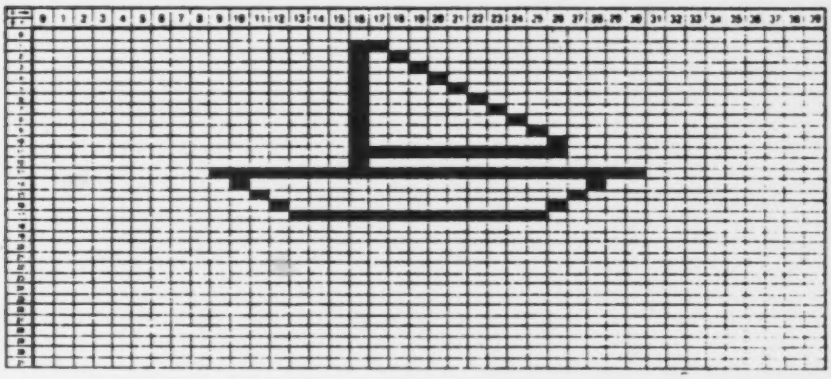
3. You are going to play the part of the computer. Use a low-resolution graph sheet as your screen. Shade in the HLIN statements with a pencil and draw the figure.

```
10  GR                      90  HLIN 3,15 AT 8
20  COLOR=15                100  HLIN 4,14 AT 9
30  HLIN 8,10 AT 4          110  HLIN 5,13 AT 10
40  HLIN 6,12 AT 5          120  HLIN 6,7 AT 11
50  HLIN 15,17 AT 5         130  HLIN 11,12 AT 11
60  HLIN 5,13 AT 6          140  HLIN 6,7 AT 12
70  HLIN 15,17 AT 6         150  HLIN 11,12 AT 12
80  HLIN 4,17 AT 7          999  END
```

4. Use a separate sheet of paper to write a graphics program that draws the Apple. Use HLIN, PLOT and COLOR statements in your program so the display looks like the picture below.



5. Using HLIN, VLIN, COLOR and PLOT statements, write a graphics program that will draw this sailboat. ONLY THE OUTLINE of the boat and sail are shown. Fill in the outline to make the boat.



FOR-NEXT LOOPS I

1. Have students type the following program:

```
 10  GR
 20  COLOR=1
 30  HLIN 1,8 AT 1
 40  HLIN 1,8 AT 2
 50  HLIN 1,8 AT 3
 60  HLIN 1,8 AT 4
 70  HLIN 1,8 AT 5
999  END
```

   Ask the students to predict what the output would be. RUN the program. What does this program draw?

2. LIST the program. Ask students whether they see a pattern in the HLIN statements?

3. Introduce the FOR-NEXT loop by rewriting the program.

```
 30  FOR Y = 1 TO 5
 40  HLIN 1,8 AT Y
 50  NEXT Y
 60
 70
```

   Explain what a FOR-NEXT loop is and how it is used in this program. RUN the new program.

4. Change line 30 to FOR Y = 1 TO 10. Have students predict the outcome of this new program.

5. Ask students how they would change the program to draw a square region whose sides were 10 pixels long.

```
 40  HLIN 1,10 AT Y
```

6. (Optional)
   Can you use the FOR-NEXT loop with VLIN statements? Draw a rectangular region 5 pixels wide and 10 pixels long.

```
 30  FOR Y = 1 TO 5
 40  VLIN 1,10 AT Y
 50  NEXT Y
```

7. Handout #3

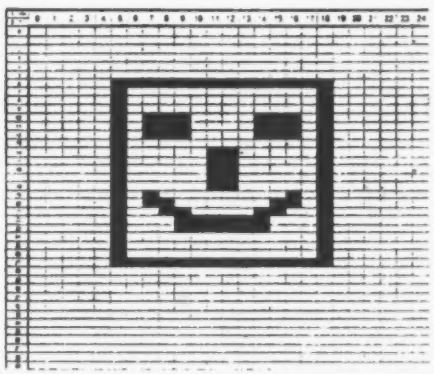
FOR-NEXT LOOPS I*

1. Write a program that will draw a rectangular region 10 pixels wide and 20 pixels high using HLIN and FOR-NEXT statements.

2. You are going to play the part of the computer. Use a low-resolution graph sheet as your screen. Shade in the various statements and draw the figure. Then type the program on the computer and RUN to check your answer.

```
10  GR                    80  HLIN 5,11 AT 21
20  COLOR=15              90  HLIN 4,12 AT 22
30  PLOT 8,5             100  HLIN 3,13 AT 23
40  HLIN 7,9 AT 6        110  VLIN 25,27 AT 5
50  FOR N=7 TO 20        120  VLIN 25,30 AT 8
60  HLIN 6,10 AT N       130  VLIN 25,27 AT 11
70  NEXT N               999  END
```

3. Write a program that will draw the face below.



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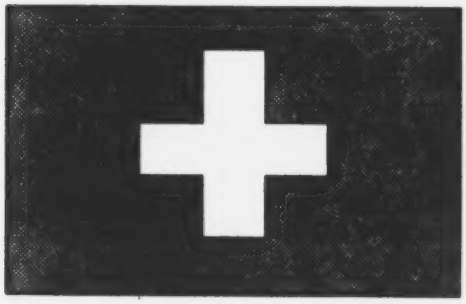
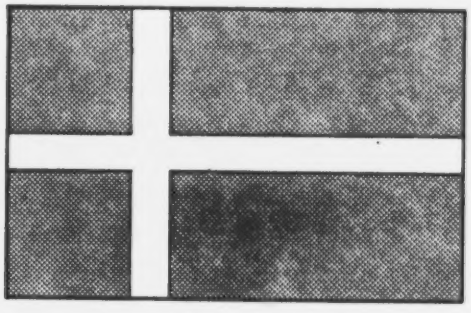
4. Write a program that will draw the flags of Switzerland and Sweden.

Switzerland (white cross with red background)



Sweden (yellow cross on blue background)



FOR-NEXT LOOPS II

1. Have students type the program below. Ask students to predict the output, then RUN the program.

```
 10  GR
 20  COLOR=1
 30  FOR Y = 2 TO 38
 40  HLIN 0,39 AT Y
 50  NEXT Y
100  END
```

2. Edit the program above. Change line 30 to:

```
 30  FOR Y = 2 TO 38 STEP 2
```

RUN this program. Ask students to describe: What is happening? How does the addition of STEP 2 change the output? What would happen if STEP 2 is changed to STEP 3? Why STEP 2 and not STEP 1?

3. Suppose you wanted to draw "fatter" stripes. Discuss the following program step by step. Ask students: What does the computer draw the first time through the loop? What does the computer draw the second time through the loop? What increment must you STEP by?

```
 10  GR
 20  COLOR=1
 30  FOR Y = 2 TO 38 STEP ?
 40  HLIN 0,39 AT Y
 45  HLIN 0,39 AT Y+1
 50  NEXT Y
100  END
```

RUN the program.

LO-RES
Handout #4

FOR-NEXT LOOPS II*

1. Write a program that will draw white stripes 3 rows wide.

2. Write a program that will draw white stripes 3 rows wide and black stripes 2 rows wide.

3. Write a program that will result in alternating blue and white stripes, each 2 rows wide.

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REM STATEMENT

1. Introduce the REM statement as a remark statement that is useful in identifying sections of the program. For example, have students type and run the following program:

```
 10  GR
 20  REM PROGRAM TO DRAW A WHITE SQUARE
 30  COLOR=15
 40  HLIN 0,6 AT 0
 50  HLIN 0,6 AT 10
 60  VLIN 0,10 AT 0
 70  VLIN 0,10 AT 6
 80  REM FILL SQUARE WITH BLUE
 90  COLOR=6
100  FOR Y = 1 TO 9
110  HLIN 1,5 AT Y
120  NEXT Y
999  END
```

   Notice that the REM statements identify what happens in each section of the program but are not actually executed by the computer.

2. Review the use of the FOR-NEXT loop in drawing a rectangular region. Notice that the region is drawn from the to bottom. Rectangular regions can also be drawn from bottom to top. Have students type the following program:

```
 10  GR
 20  COLOR=1
 30  FOR Y = 10 TO 30
 40  HLIN 5,15 AT Y
 50  NEXT Y
999  END
```

   Have students predict what the output will be. Then RUN the program. This program draws the rectangular region from top to bottom. Change line 30 to

```
 30  FOR Y = 30 to 10 STEP -1
```

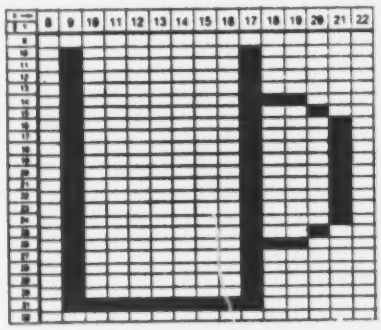
   Run the program. This program draws the rectangular region from bottom to top. Discuss possible situations that could utilize this kind of graphic (for example, filling a cup of water, an elevator, rising mercury in a thermometer).

3. Handout #5

STRIPES*

1. Write a program that uses a FOR-NEXT loop to fill the mug with water. The first part of the program is completed for you.

```
 10  REM**PROGRAM TO FILL MUG WITH WATER**
 20  GR
 30  COLOR=15
 40  REM**DRAWS MUG**
 50  VLIN 10,31 AT 9
 60  VLIN 10,31 AT 17
 70  HLIN 9,17 AT 31
 80  VLIN 16,24 AT 21
 90  HLIN 18,19 AT 14
100  HLIN 18,19 AT 26
110  PLOT 20,15
120  PLOT 20,25
130  REM**FOR-NEXT LOOP TO FILL MUG**
. . .
999  END
```



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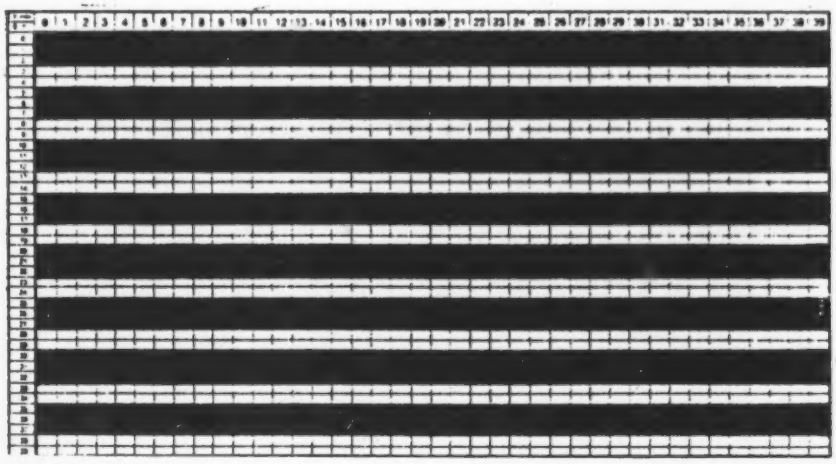
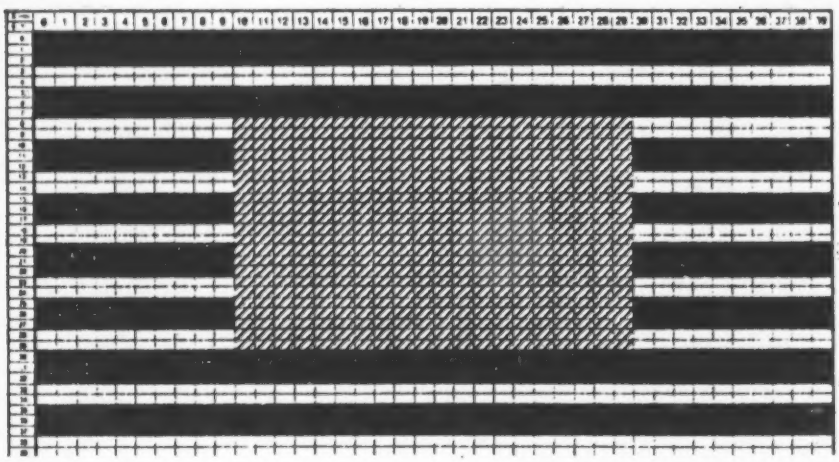
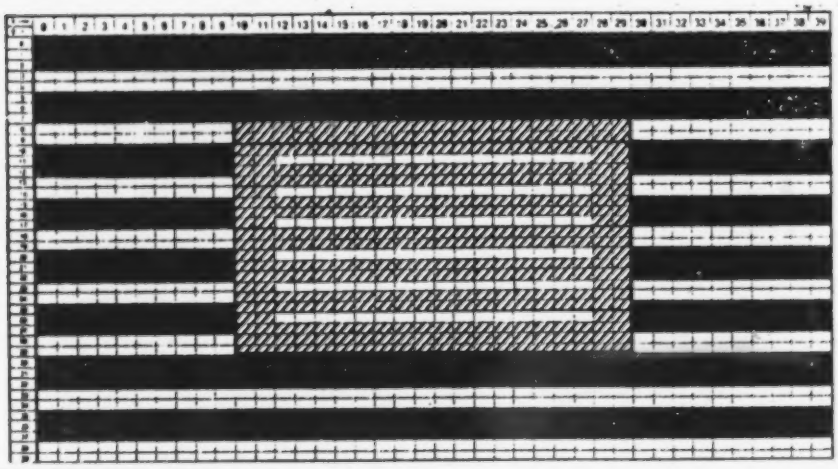
2. Write a program that uses a FOR-NEXT loop to color the screen white from line 0 to line 39. Use a second FOR-NEXT loop to draw blue stripes (three HLIN's thick) from line 0 to line 35. You will need a STEP by 5.



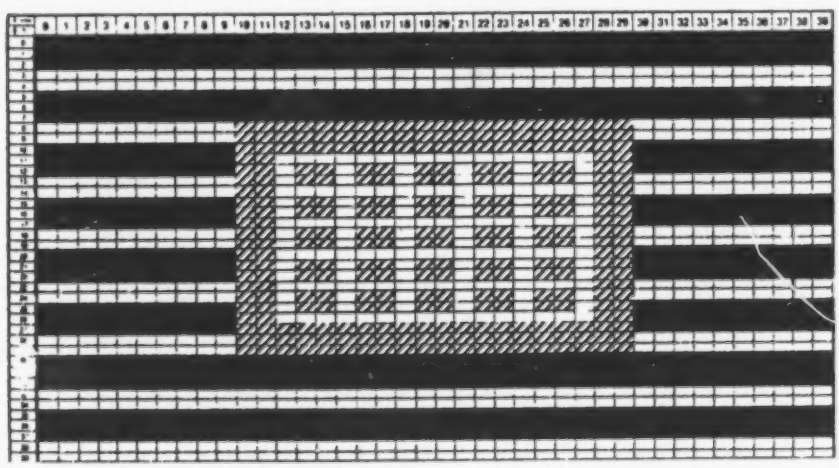
Draw a red rectangular region at the center of the flag. Look closely at the numbers on the grid to see where it should start and end.



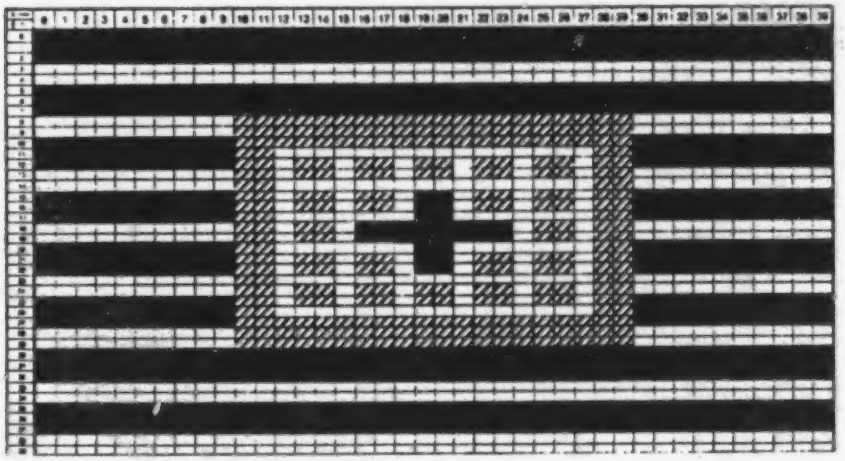
Using a FOR-NEXT loop, draw six white horizontal lines in the rectangular region. (Hint: The FOR-NEXT loop should start at 11 and end at 26 and STEP by 3.)



Using a FOR-NEXT loop, draw six VLIN's across the red rectangular region.



Use two HLIN's and two VLIN's to draw a blue cross in the center of the red rectangular region. The final graphics picture should look like this:



ANIMATION

1. Explain that there may be times when the computer draws too quickly. To slow it down or to pause at certain places, you can include a time-delay loop where the computer will stop and count before drawing again. For example, have the students type and RUN the following program:

```
 10  GR
 20  COLOR=1
 30  FOR Y = 10 TO 30
 40  HLIN 5,15 AT Y
 50  FOR T = 1 TO 200: NEXT T
 60  NEXT Y
999  END
```

   Change the number 200 in line 50 to a larger or smaller number. What effect does that have?

2. Introduce the concept of animation by having students PLOT a pixel on the screen and then making it disappear. For example,

```
 10  GR
 20  COLOR=1
 30  PLOT 10,10
 40  COLOR=0
 50  PLOT 10,10
999  END
```

   If the pixel lights up and disappears too quickly, insert the time-delay loop.

3. Have students write a program that will make a pixel "travel" in a line across the screen. (You may want to include a FOR-NEXT loop in the program.) Once the students become familiar with the "draw-erase-draw" principle, have them animate a line segment.

4. Handout #6
   REM statements to identify the different sections of the program (pumpkin, eyes, mouth, blinking eyes).

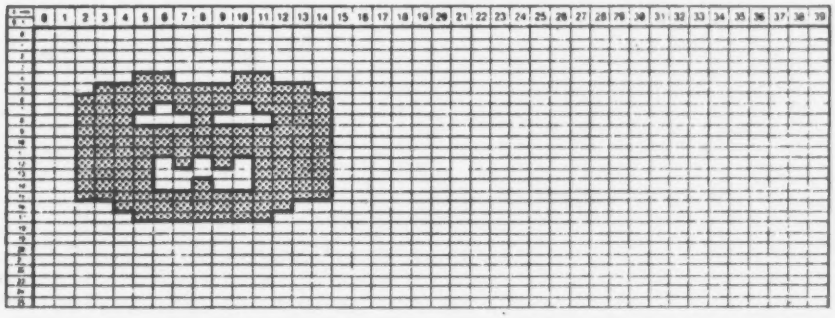
5. Assign each student (or a pair) a project of creating his or her own low-resolution graphics design. The design should include the various statements used in the previous lessons including REM statements to describe each section of the program.

Plan alternatives for sharing: print copies of design and display on bulletin board, have students share designs and programs on a large monitor, or have designs loaded on computers in the lab for sharing.

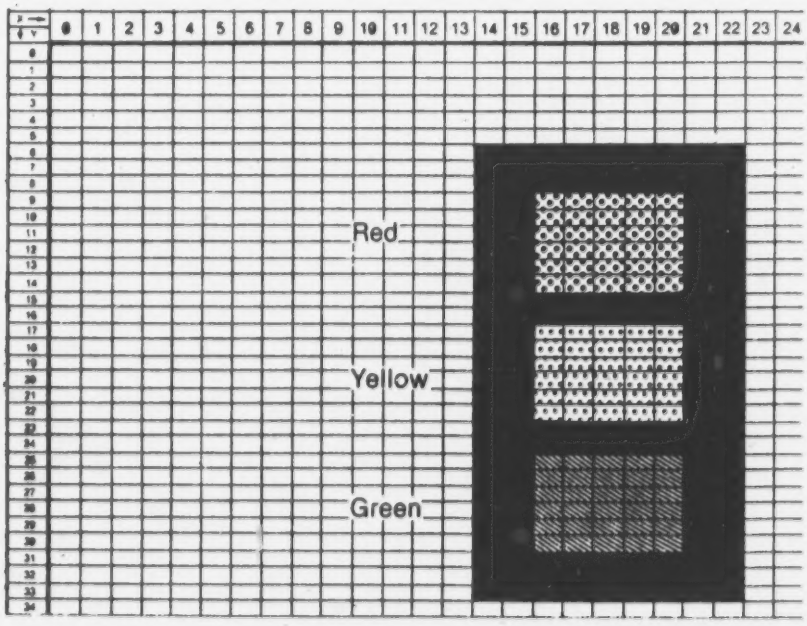
(Optional) Have students print designs using printer ribbon that creates iron-on decals for T-shirts.

ANIMATION*

1. Using HLIN and PLOT statements, write a program that draws a JACK-O-LANTERN. Add the lines that will make its eyes flash from black to yellow.



2. Using HLIN and FOR-NEXT loops, write a program that draws a traffic control signal. The blocks of colors for the lights flash from green to yellow to red. The block of color should change to gray after it flashes.



*Further reproduction is prohibited. See footnote on page

RESOURCES

TEXTBOOKS

1. Computer Literacy: A Hands-on Approach. Arthur Luehrmann and Herbert Peckham. McGraw-Hill. 1986.

   Introduction to Computer Applications: A Hands-on Approach. Arthur Luehrmann and Herbert Peckham. McGraw-Hill. 1986.

2. Computer Literacy Through Applications. Barbara Kurshan. Houghton Mifflin. 1986.

3. MacMillan Computer Literacy. Peter Dubin and Peter Kelman. MacMillan. 1986.

4. Scholastic Computing -- An Introduction to Computers. Jack L. Roberts. Scholastic Inc. 1984.

5. Spotlight on Computer Literacy. Ellen Richman. Random House. 1985.

SOFTWARE

WORD PROCESSING

Bank Street Writer; Broderbund Software; Apple, C64, IBM
Magic Slate; Sunburst; Apple
Milliken Word Processor; Milliken; Apple
PFS: Write; Software Publishing; Apple, IBM
SuperScripsit; Radio Shack; TRS-80
The Word Processor; Better Working Series; Apple, C64, IBM

DATABASE

Friendly Filer; Grolier Electronic Publishing; Apple, C64, IBM
PFS: File/Report; Software Publishing; Apple, C64, IBM, TRS-80
ProFile; Radio Shack; TRS-80

SPREADSHEET

PFS: Plan; Software Publishing; Apple, IBM
The Spreadsheet; Better Working Series; Apple, C64, IBM
Visicalc; Software Arts; Apple, IBM, TRS-80

APPENDIX

The Taxonomy of Goals, Objectives and Student Expectations for Exploratory Computer Literacy, Grades K-12

GOAL 1: The student will feel confident about using computers.

1.1. Interacts with a prepackaged computer program.

- 1.1.1. The student recognizes that a computer needs instructions to operate.
- 1.1.2. The student reads computer instructions, keyboard and output.
- 1.1.3. The student uses basic control keys and commands.
- 1.1.4. The student selects and uses appropriate written resources (e.g., handouts, manuals) for operating the computer.
- 1.1.5. The student experiments with programs as a user.
- 1.1.6. The student takes appropriate action in response to error messages in using prepackaged programs.

1.2. Identifies the need for information to be processed according to a set of predefined computer rules: organized, coded, given meaning and transmitted.

- 1.2.1. The student gives reasons for processing information.
- 1.2.2. The student identifies the structural components of information processing, e.g., organizing, coding, processing and reporting.
- 1.2.3. The student sequences the steps required in a process.
- 1.2.4. The student recognizes that computers process information by searching, sorting, deleting, updating, summarizing, storing, etc.

1.3. Given a simple algorithm/flowchart explains what it accomplishes, i.e., interprets, generalizes, and discusses applications.

- 1.3.1. The student interprets a simple algorithm/flowchart.
- 1.3.2. The student generalizes how an algorithm/flowchart is used.
- 1.3.3. The student discusses the applications of algorithms/flowcharts.

1.4. Identifies the fact that we communicate with computers through specific symbols and words.

- 1.4.1. The student recognizes that programming languages are used to give the computer instructions.
- 1.4.2. The student recognizes words or symbols that operate the computer.

1.5. Develops positive attitudes and behaviors toward computers.

- 1.5.1. The student demonstrates positive behaviors and attitudes towards computers by seeking work or play with computers.
- 1.5.2. The student demonstrates positive behaviors and attitudes towards computers by describing past experiences with computers with positive affect words like fun, challenging, etc.

GOAL 2: The student will know how the computer can be used as a tool for problem solving and decision making.

2.1. Uses computerized information systems (computer or computer system) to solve simple problems and make decisions.

2.1.1. The student uses the computer to assist in decision making.
2.1.2. The student translates a simple algorithm/flowchart into a program.
2.1.3. The student develops an algorithm for solving a specific problem and/or solve a set of similar problems.
2.1.4. The student describes how computers can assist in problem solving and decision making.

GOAL 3: The student will be aware of, appreciate and understand the functions and impact of computers in daily life.

3.1. Identifies and describes basic operations of computer systems including identification of input, memory, control, arithmetic and output components.

3.1.1. The student identifies the Input/Output peripherals.
3.1.2. The student describes the functions of the Input/Output and Processing (control, memory, arithmetic/logic) components.

3.2. Recognizes data processing, process control, and information storage and retrieval applications in business and industry, government, education, health and social services, recreation, creative arts, etc.

3.2.1. The student identifies computer applications in business and industry, government, education, health and social services, recreation, creative arts, etc.

3.3. Recognizes how computers affect employment, public surveillance, privacy of individuals, progress and culture, personalization/ impersonalization, regulatory and enforcement functions, and daily relationships with people, agencies, organizations, etc.

3.3.1. The student values efficient information processing.
3.3.2. The student understands the advantages and disadvantages of routine tasks.
3.3.3. The student appreciates the economic benefits of computerization for society.
3.3.4. The student values increased communication and availability of information made possible through computer use.
3.3.5. The student understands that computers can be used to effect distribution and use of economic and political power, in criminal and other anti-social activities, to change society in undesirable ways.
3.3.6. The student identifies applications of computer science and technology in medicine, law enforcement, education, engineering, business, transportation, military, recreation, government, library and creative arts.

3.4. Recognizes that technology differs from science in that the aim of technology involves the means of building and doing useful things while the aim of science is the development of knowledge and understanding.

3.4.1. The student knows how electronic technology evolved.

GOAL 4: The student will recognize the limitations as well as the usefulness of computer (science) technology in advancing human welfare.

4.1. Recognizes disadvantages of computers as tools, dependency, limitations, cost, etc.

4.1.1. The student lists at least three limitations of computers in the advancement of human welfare.

4.2. Identifies major applications of computers for information storage and retrieval, simulation and modeling, quality or process control, and decision making and problem solving.

4.2.1. The student describes how computers assist people in advancing human welfare.

GOAL 5: The student will recognize the educational and career opportunities related to the specific and general uses (applications) of computers.

5.1. Recognizes careers in Support Services (e.g., data entry, word processing, computer operations personnel), Technical Services (e.g., programmer, analyst, data processor, equipment maintenance and repair personnel), Scientific Personnel (e.g., computer scientist, electrical engineer, computer engineer) in the community that involve computers.

5.1.1. The student identifies support service, technical and scientific careers that involve computers.

5.1.2. The student identifies national and international careers that involve computers.

5.2. Recognizes opportunities related to integrating the computer in other careers.

5.2.1. The student compares educational requirements and opportunities for careers that involve computers.